



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,612	11/20/2003	Walter Schwarzenbach	4717-7700	7150
28765	7590	07/26/2005	EXAMINER	
WINSTON & STRAWN LLP 1700 K STREET, N.W. WASHINGTON, DC 20006			PHAM, THANHHA S	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/716,612

Applicant(s)

SCHWARZENBACH ET AL.

Examiner

Thanhha Pham

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 24-33 is/are pending in the application.
- 4a) Of the above claim(s) 6,8,9 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,10-13 and 24-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/2/04, 11/20/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to Applicant's Amendment dated 05/05/2005.

Election/Restrictions

1. Claims 6, 8, 9 and 33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to non-elected species. Applicant timely traversed the restriction (election) requirement in the reply filed on 05/05/2005.
2. Applicant's election with traverse of claims 1-4, 5, 7, 10-13, 24-30, 31, 32 drawn to species of substantially vertical orientation for the application of the basis thermal budget, the application of basis thermal budget prior to the additional thermal budget and using positioner configure for holding the wafer substantially in the reply filed on 05/05/2005 is acknowledged. The traversal is on the ground(s) that there is no additional burden to examine all of patentable distinct species. This is not found persuasive because distinct species require different search and consideration. Therefore, there is a serious burden for examiner to examine all of patentable distinct species. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Base on what being discussed above, the requirement is still deemed proper and is therefore made FINAL.

Oath/Declaration

3. Oath/Declaration filed on 03/12/2004 has been acknowledged.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: the diffusion barrier 220 (specification page 9) is not shown in figures. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

Art Unit: 2813

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 2 and 25-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

► With respect to claim 2, "the weakened portions" lacking antecedent basis should be changed to "the weakened zone".

► With respect to claim 24, "the heating device" lacking antecedent basis should be changed to "the heating essembly"

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Henley et al [US 6,048,411].

► With respect to claim 1, Henley et al (figs 1-11, cols 1-9) discloses the claimed method of annealing a wafer, comprising:

applying a basic thermal budget to a weakened zone (implanted region) of a wafer substantially evenly over the weakened zone, the basic thermal budget being insufficient to detach a detachment layer from a remainder of the wafer at the weakened zone (col. 5 lines 1-10 & 27-35, fig. 3: *heating the wafer to intermediate temperature to raise*

Art Unit: 2813

stress in implanted region of wafer to initiate the cleaving action without cleaving action & establish thermal gradient across wafer would apply the basis thermal budget to the implanted region/weakened zone of the wafer substantially evenly over the implanted region/weakened zone when the thermal budget being insufficient to detach a detachment layer 12 from a remainder of the wafer at the weakened zone) ;

and

applying an additional thermal budget locally in an initiation region of the weakened zone in which the basic thermal budget is applied for initiating detachment of the detachment layer at the weakened zone (col. 5 lines 12-27: *locally heating for cleaving action would apply the additional thermal budget locally in initiation region of the implanted region/weakened zone for detachment of the detachment layer 12 at the implanted region/weakened zone*).

- ▶ With respect to claims 2-3, Henley et al (fig 3, col 3-5) shows the weakened zone extending through a crystalline layer of the wafer comprising a semiconductor material.
- ▶ With respect to claim 7, Henley et al (col. 5 lines 27-35) discloses the basis thermal budget is applied before the application of the additional thermal budget.
- ▶ With respect to claim 13, the basis thermal budget of Henley et al is sufficiently high such that the application of the additional thermal budget causes the detachment to propagate through the weakened zone.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

Art Unit: 2813

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4-5, 24-26, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al [US 6,048,411] in view of Nishi et al [US 5,616,264].

► With respect to claims 4-5, Henley et al substantially discloses the claimed method including applying a basis thermal budget to the weakened of the wafer substantially evenly over the weakened zone. Henley et al is silent about using a plurality of heating elements operated to provide different amount of heat to substantially evenly apply the basic thermal budget wherein the basic thermal budget is applied to the wafer in a substantially vertical orientation.

However, Nishi et al (fig 1, cols. 2-6) discloses using heating elements (3a-3c) operated to provide different amount of heat to substantially evenly apply the basic thermal budget wherein the basic thermal budget is applied to the wafer in a substantially vertical orientation (using vertical positional furnace) to heat wafer uniformly.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify process of Henley et al by applying the basis thermal budget as being claimed, per taught by Nishii et al, to provide a better control applying the basic thermal budget uniformly over the weakened zone.

► With respect to claims 24-26, 30 and 32, Henley et al substantially discloses the claimed method including applying the thermal budgets to the wafer for wafer annealing process. Henley et al does not expressly mention in written disclosure that the thermal budget are applied while the wafer is present in a wafer annealing device comprising a

Art Unit: 2813

positioner configured for holding the wafer and a heating assembly configured for applying the thermal budgets *[claim 24]* wherein the heating assembly comprising a plurality of heating element disposed adjacent different portions of the wafer; and a controller assembly operably associated with the heating elements for control controlling the heating of different heating elements to produce different amount of heat to substantially evenly apply the basis thermal budget *[claim 25]*, wherein the controller assembly is operably associated with the heating element for independently controlling the different heating elements *[claim 26]*, wherein the heating elements extend generally horizontally and are stacked in a generally vertical direction for heating *[claim 30]* wherein the heating elements substantially surrounding the wafer held by the positioner *[claim 32]*.

However, using the annealing device comprising the positioner configured for holding the wafer and the heating essembly configured for applying thermal budget has been known in the art. See Nishii et al (figs 2 & 9, col 4-7 & 10) as an evidence discloses the annealing device comprising the positioner (wafer boat 5) configured for holding the wafer and the heating essembly (3a-3c/18a-18c/19a-19c/20/22) configured for applying thermal budget in annealing wafer *[claim 24]* wherein the heating assembly comprising a plurality of heating element (3a-3c) disposed adjacent different portions of the wafer; and a controller assembly (18a-18c/19a-19c/20/22) operably associated with the heating elements (3a-3c) for control controlling the heating of different heating elements to produce different amount of heat to substantially evenly apply the basis thermal budget *[claim 25]*, wherein the controller assembly is operably associated with

the heating element for independently controlling the different heating elements *[claim 26]*, wherein the heating elements (3a-3c) extend generally horizontally and are stacked in a generally vertical direction for heating *[claim 30]* wherein the heating elements substantially surrounding the wafer held by the positioner *[claim 32]*.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify process of Henley et al by using the annealing device as being claimed, per taught by Nishi et al, to apply the thermal budgets for annealing the wafer in detachment process and provide a better control for applying the basis thermal budget by uniformly heating the weakened zone of the wafer.

8. Claims 10-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al [US 6,048,411] in view of Okayama et al [US 2001/0035124].

Henley et al substantially discloses the claimed method including applying a basis thermal budget to the weakened of the wafer substantially evenly over the weakened zone. Henley et al is silent about flowing a heat conducting gas over the wafer and controlling the flow over a plurality of regions on the wafer for applying the even basic thermal budget *[claim 10]* wherein the flow of heat conducting gas is controlled by flowing the gas across a diffusion barrier damper to the wafer *[claim 11]* wherein the flow of heat conducting gas is controlled by flowing the gas across a perforated heating chamber damper to the wafer *[claim 12]*.

However, Okayama et al (figs 1-2, text [0010]-[0085]) flowing the heat conducting gas (nitrogen) over the wafer (W) and controlling the flow over a plurality of regions on the wafer for applying the even basic thermal budget (uniform heating the wafer) *[claim*

Art Unit: 2813

10] wherein the flow of heat conducting gas is controlled by flowing the gas across a diffusion barrier damper to the wafer (52) **[claim 11]** wherein the flow of heat conducting gas is controlled by flowing the gas across a perforated heating chamber damper (52, fig 2) to the wafer **[claim 12]**.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify process of Henley et al by flowing the heat conducting gas as being claimed, per taught by Okayama et al, to provide a better control applying the basic thermal budget uniformly over the weakened zone.

9. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al [US 6,048,411] in view of Nishi et al [US 5,616,264] as applied to claim 25 above in further view of Okayama et al [US 2001/0035124].

Henley et al in view of Nishi et al substantially discloses the claimed method except teaching using the heating assembly comprises: a gas feed for flowing a heat conducting gas for transferring heat to the wafer; and a gas control assembly configured for controlling the distribution of the gas flow in association with the wafer **[claim 27]** wherein the gas control assembly comprises a diffusion damper configured to cause the gas to flow in a predetermined configuration **[claim 28]** wherein the diffusion damper comprises a perforated heating chamber in which the wafer is received for heating or a diffusion barrier **[claim 29]**.

However, Okayama et al (figs 1 & 2, text [0001]-[0085]) teaches using the heating assembly (fig 2) comprises a gas feed for flowing a heat conducting gas for transferring heat to the wafer; and a gas control assembly configured for controlling the

Art Unit: 2813

distribution of the gas flow in association with the wafer *[claim 27]* wherein the gas control assembly comprises a diffusion damper (52) configured to cause the gas to flow in a predetermined configuration *[claim 28]* wherein the diffusion damper (52) comprises a perforated heating chamber in which the wafer is received for heating or a diffusion barrier *[claim 29]*.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify process of Henley et al in view of Nishi et al by using the heating assembly comprising the gas feed and the gas control assembly as being claimed, per taught by Okayama et al, to efficiently provide a better control applying the basic thermal budget uniformly over the weakened zone

10. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henley et al [US 6,048,411] in view of Nishi et al [US 5,616,264] as applied to claim 30 above, and further in view of Massey et al [EP0291147].

Henley et al in view of Nishi et al substantially discloses the claimed method including using the positioner configured for holding the wafer substantially vertically for heating.

However, using the positioner configured for holding the wafer substantially vertically for heating has been known in the art. See Massey et al (fig 1, col 1-12) as an evidence that shows using the positioner (114) configured for holding the wafer substantially vertically for heating.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify process of Henley et al in view of Nishi et al by using the positioner as

Art Unit: 2813

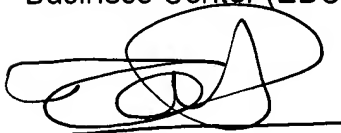
being claimed, per taught by Massey et al, as the conventional positioner to hold the wafer vertically for heating wafer with a proper control heating free of contaminant.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Thanhha Pham
Patent Examiner
Patent Examining Group 2800